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(71) Applicant (for all designated States except US): **THE REGENTS OF THE UNIVERSITY OF CALIFORNIA, BERKELEY** [US/US]; 2150 Shattuck Ave. Suite 510, Berkeley, CA 94704 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **CONOLLY, Steven, M.** [US/US]; 907 Embarcadero Road, Palo Alto, CA 94303 (US). **GOODWILL, Patrick, W.** [US/US]; 2745 Mission St., Apt. 4, San Francisco, CA 94110 (US).

(74) Agents: **JACOBS, Ron** et al.; 350 Cambridge Avenue, Suite 100, Palo Alto, CA 94306 (US).

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[Continued on next page]

(54) Title: IMPROVED TECHNIQUES FOR MAGNETIC PARTICLE IMAGING

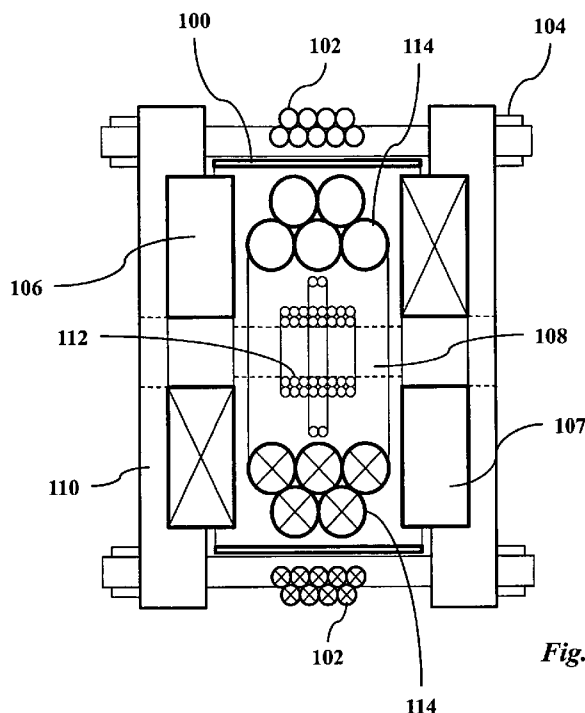


Fig. 1A

(57) Abstract: A magnetic particle imaging apparatus includes magnets [106,107] that produce a gradient magnetic field having a field free region (FFR), excitation field electromagnets [102,114] that produce a radiofrequency magnetic field within the field free region, high-Q receiving coils [112] that detect a response of magnetic particles in the field free region to the excitation field. Field translation electromagnets create a homogeneous magnetic field displacing the field-free region through the field of view (FOV) allowing the imaging region to be scanned to optimize scan time, scanning power, amplifier heating, SAR, dB/dt, and/or slew rate. Efficient multi-resolution scanning techniques are also provided. Intermodulated low and radio-frequency excitation signals are processed to produce an image of a distribution of the magnetic nanoparticles within the imaging region. A single composite image is computed using deconvolution of multiple signals at different harmonics.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/003764**A. CLASSIFICATION OF SUBJECT MATTER****A61B 5/05(2006.01)i, A61K 49/18(2006.01)i, G01R 33/02(2006.01)i, G05F 1/00(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61B 5/05; G01N 11/00; G01R 33/02; G01R 33/12; G01V 3/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models since 1975.
Japanese utility models and applications for utility models since 1975.

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: MPI, magnetic, particle, frequency, magnet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2003-0085703 A1 (BERNHARD GLEICH) 08 May 2003 See abstract, paragraphs 0001-0054, claims 1-14 and figures 1-5.	1-39
A	US 2008-0309330 A1 (OHYU SHIGEHARU et al.) 18 December 2008 See abstract, paragraphs 0003-0041, claim 1 and figures 1-16.	1-39
A	US 2006-0248944 A1 (GLEICH BERNHARD et al.) 09 November 2006 See abstract and claims 1-14.	1-39
A	US 2008-0218162 A1 (RUHRIG MANFRED) 11 September 2008 See abstract, paragraphs 0029-0033 and claims 1-8.	1-39

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Korean Intellectual Property Office
Government Complex-Daejeon, 139 Seonsa-ro, Seo-
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RYU, SI UNG

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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